

A Perspective on Educating Physicians for Prevention

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IF THE GOALS of "Healthy People" (1) and of "Objectives for the Nation" (2) are to be achieved, change in undergraduate medical education is not optional, it is mandatory. Further, the change I advocate is not simply to make preventive medicine a co-equal discipline; it cannot be achieved by adding a course here or there or by increasing the proportion of teaching time from the present average of around 2 percent to the level recommended by the American Association of Medical Colleges in 1945, around 4 percent (3). The necessary change is the recognition that, as far as health is concerned, preventive medicine is the pre-eminent discipline. Medical education as it is presently organized in this country can best be characterized as "Disease-Oriented Physician Education" (DOPE). To achieve the stated health goals, "DOPE" will have to be replaced by "HOPE" (Health-Oriented Physician Education).

Basic Assumptions

My presentation is based on several assumptions. They are as follows:

1. The conclusions of "Healthy People" concerning both the power of and the national need for health promotion and disease prevention, are correct (1a).

2. The assumptions stated in the call for this symposium are correct.

- Prevention is a basic and multidimensional element of health care.
- The concepts of disease prevention and health promotion encompass but are not limited to the range of activities necessary to achieve the goals of "Healthy People" and the measurable objectives outlined in "Objectives for the Nation."
- Physicians have a central role in the conduct of many of these activities, and achievement of the goals and objectives thus depends on their participation and leadership in these efforts.
- Achievement of the goals and objectives will also require the efforts of other health professionals who are prepared to conduct disease prevention and health promotion activities.
- Presentation of the fundamentals of prevention throughout the process of medical education is essential to ensuring its appropriate emphasis in clinical practice or research.
- Elements of prevention are common to all medical practice, regardless of specialty, and they are appropriately addressed

in the undergraduate education provided all medical students.

- The extent to which physicians incorporate prevention into their medical practice depends in part upon the extent to which not only undergraduate medical education, but also graduate and continuing medical education prepares and encourages them to do so.
- The creation of bridges linking these levels of medical education is essential to ensuring full physician participation in disease prevention and health promotion efforts.
- The current focus on preventive aspects of medicine is, in part, an attempt to specify and organize in a systematic way elements that have always been implicit in the concept of medical practice.

3. It is reasonable to believe that the "Objectives for the Nation" can be achieved using mainly existing technology and knowledge, if these are properly developed and implemented.

4. The position of "Healthy People" on the professional role in prevention and the need for change in education for the health professions is correct. It is worth repeating (1b):

Physicians, nurses, and other health professionals have a particular opportunity and obligation to provide information and services necessary to promote better health and prevent disease. People continue to note that they would be more likely to try to change their behaviors if their physicians strongly recommended such changes . . . [Physicians] need to be trained to view themselves as educators and models, as well as practitioners of a particular discipline.

5. To repeat my opening statement, in this context, major change in undergraduate medical education is not optional; it is mandatory.

Some Basic Definitions

Preventive medicine may be defined as the application of the biomedical, behavioral, and epidemiologic sciences to the promotion of health and the elimination or early detection of disease in populations and individual persons. There are two ways of categorizing preventive medicine measures. First we can describe personal measures (those provided on a one-to-one basis to individuals) and community measures (provided to communities as a whole). Second, we can describe primary, secondary, and tertiary prevention. Primary prevention is thwarting disease before it occurs. Secondary prevention is finding inapparent disease and treating it early. Tertiary prevention is effectively treating apparent disease to prevent later, serious complications.

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Community medicine has been defined by Deuschle as "a clinical approach to the identification and solution of health programs of populations or communities of people" (4). The planning, development, operations, and evaluation of health care programs are subsumed under community medicine, a discipline that uses applied epidemiology as its basic scientific tool. In community medicine, preventive, treatment, personal and communitywide interventions may be employed.

Preventive medicine as a medical discipline has some special distinguishing characteristics that create problems. Most medical disciplines can be classified as a clinical specialty or a basic science. Preventive medicine, however, is both a set of basic sciences and a set of clinical disciplines. Within each set are further subdivisions, and these characteristics help to account for preventive medicine's present less-than-secure place in the medical education system.

The basic sciences of preventive and community medicine are epidemiology, biostatistics, and analysis of health care delivery systems. Simply defined, epidemiology is the study of the distribution of health and disease in populations. Biostatistics is the discipline that interprets chance phenomena and forms the basis for the quantitative understanding of biomedical problems and processes. Analysis of health care delivery systems is the study of the social, political, and economic structures that provide medical and health services to the population. The clinical disciplines are personal and community preventive medicine and community medicine.

Another difficulty with preventive medicine as a discipline in medical education is that, unlike most

other medical disciplines, its practice is not confined to those who specialize in it. Personal preventive medicine, if it is to be applied effectively to the population, must be part of the clinical practice of virtually all physicians who take care of individual patients.

The Importance of Disease Prevention

I would like to review briefly the importance and power of prevention for the health of the American people. The "Armamentarium of Prevention" is a formidable collection of measures (see box). It is both broad and deep. Some components are specific measures known to reduce disease; others reduce the risk of disease. The table shows the well-known list of current leading killer diseases and conditions. Most of these causes can be reduced, at least in part, by the application of known preventive measures also listed in the table. A number of important nonkiller diseases and conditions, such as tuberculosis, venereal diseases, and nonfatal accidents, could be significantly reduced as well. More research on effective methods of modifying lifestyles and changing behavior, consistent with basic democratic values, is certainly needed; the potential benefits of such interventions are clear.

Practicing Physician's Role in Prevention

Obviously, the entire burden of improving the practice of prevention and health promotion cannot be placed upon the medical profession. There are multiple causes of ill health in our society. The Armamentarium of Prevention contains a number of health promotive-disease preventive measures that are community rather than personal, as those terms have been previously defined. Habits promotive of ill health, such

Uses of the Armamentarium of Prevention against the leading causes of death, United States, 1979

Rank	Cause of death	Rates per 100,000 population	Preventive measures
1	Diseases of the heart	330	Lifestyle and behavioral change, nutrition, casefinding and treatment of hypertension
2	Malignant neoplasm	184	Modern environmental sanitation, industrial hygiene, lifestyle change, nutrition, early detection
3	Cerebrovascular disease	76	Casefinding and treatment of hypertension
4	Accidents	47	Industrial and automotive safety, risk modification
5	Chronic obstructive pulmonary diseases and allied conditions	23	Lifestyle change, industrial hygiene, modern environmental sanitation
6	Pneumonia and influenza	20	Immunization
7	Diabetes mellitus	15	Casefinding and treatment (considered by some to be secondary or tertiary preventive measures)
8	Cirrhosis of the liver, chronic liver disease ..	15	Lifestyle change
9	Suicide	12	Community suicide prevention services
10	Certain conditions originating in the perinatal period	11	Improved prenatal and natality services
11	Homicide	10	Gun control

The Armamentarium of Prevention—1980

1. Programs for lifestyle and behavioral change
 2. Screening, casefinding, and contact investigation
 3. Immunization
 4. Measures concerned with conception and birth:
 - a. Family planning
 - b. Genetic counseling
 - c. Prenatal care
 - d. Abortion services
 - e. Maternal and child health services
 5. Nutrition programs and services
 6. Accident prevention and risk modification
 7. Suicide prevention
 8. Industrial safety and hygiene
 9. Measurement and analysis: applied epidemiology
 10. Environmental sanitation:
 - a. Pure water supply
 - b. Sanitary sewage disposal
 - c. Solid waste disposal
 - d. Vector control
 - e. Water, air, and ground pollution control
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as cigarette smoking and the abuse of drugs and alcohol, are actually encouraged or at least supported by certain sectors of the economy and certain governmental actions. Thus, the physician must recognize that, even with the best of personal preventive measures, success will not be achieved with every patient.

Nevertheless, the individual physician who wants to can do a great deal in prevention. The physician can incorporate personal preventive measures into his or her practice, carrying some out him- or herself, using health-promotive professionals in a multi-disciplinary team practice, and using community resources knowl-edgeably. The report of the Canadian Task Force on the Periodic Health Examination (5) provides an excellent guide for the physician interested in incorporating clinical preventive services into his or her practice, and the physician can set an example of healthy living for his or her patients. The physician who so desires can engage in political action dealing with community preventive measures. Despite the gradual relative decline in public esteem that the medical profession has endured in recent years, it should not be forgotten that medicine is still the leading profession in the health care delivery system. Further, it is central to the operation of that system.

Centrality of the Physician

At present, physicians control much of the health care delivery system. They give it its tone, its ethic, its directions, its emphases, and its priorities for programs and expenditures. In a highly complex system with

multiple loci of power, they are not the sole leaders, but they are the most important ones.

There are four reasons for their power. First, the medical licensing system gives physicians control over the health care delivery system's functions of making diagnoses, prescribing drugs from a restricted list, and performing surgery. Second, physicians have the highest level of training in biomedical science, the scientific basis for our modern health care delivery system. Third, because of the peculiarity of the health services market, physicians determine about two-thirds of the total expenditures in the system. Fourth, for most people, the physician is the healer, a role that is almost mystical in its importance in the mind of the public.

Disease Orientation

Physicians are, by and large, disease-oriented (6a). In most specialties, for example, they concentrate on the management of the acute phases of chronic disease after it has become clinically well-manifest. As Colombotos has pointed out (7):

The practice of medicine in this country is oriented toward the diagnosis and treatment of disease, rather than toward its prevention. This orientation is reflected in how the overall health care system is organized and in its *incentives* (e.g. how practitioners are reimbursed for their services). On the level of the individual physician, it is reflected in the great *professional satisfaction* and stimulation he or she derives from curative activities rather than from preventive endeavors and in his or her perception of the greater *medical value* of the former.

Since physicians are so central to the operations of the health care delivery system it should not be surprising that it is, in fact, a disease-care delivery system. To implement the Armamentarium of Prevention, the health care delivery system will have to become health- and prevention-oriented. If that is to happen, physicians and other health professionals will have to have significantly improved education and training in prevention.

As I stated previously, this goal will not be achieved by tinkering with the present philosophy and curriculum of undergraduate medical education. Wholesale change is needed. To this end, I offer "HOPE" (6b).

Health-Oriented Physician Education

The HOPE system has five principal components. First, HOPE is prevention-oriented. Medical students would begin by studying populations and their health rather than cells and their diseases. As do those in most professions other than medicine, they would begin with the general and proceed toward the particular, rather than beginning, as they do now, with the par-

ticular and proceeding toward, although hardly ever reaching, the general. Epidemiology would be recognized for what it is—the most basic of the basic sciences for the practice of medicine. Preventive medical practice would become an integral part of all clinical training, rather than a subject, separate and apart, as it is in so many medical schools.

Second, HOPE employs problem-based learning as its principal instructional technique, replacing the memory-based learning system common in today's medical schools. A successful model for this approach is already in place at the McMaster University School of Medicine in Hamilton, Ontario (8). The problem-based approach is essential if promoting health and preventing illness are to rank with fighting disease among the physician's responsibilities. Health-oriented practice requires problem-oriented practice. In health-oriented practice, the physician often confronts problems or situations rather than diagnoses—life style factors, stress management, occupational hazards, family planning needs, and so forth. Furthermore, the modern physician must be skilled in practice management, the operation of referral systems, team organization, research and evaluation, and professional and patient education. Therefore, the health-oriented physician must be trained in the problem-solving mode so that solving problems will become second nature to him or her.

Third, computer-assisted instruction, leading toward computer-assisted practice, must go hand in hand with problem-based learning. The modern disease-treatment-oriented physician is a captive of his or her memory. Physicians, once freed by computers from the necessity of doing an overwhelming amount of random memory work—for example, in making diagnoses or in choosing appropriate drug therapies—will be much more able to provide the integration, patient communication, and patient education that is necessary in a prevention-oriented practice. Further, the use of the online computer will advance greatly the quality of clinical practice. This component of HOPE owes much to the work of Weed (9).

Fourth, in HOPE, the medical school itself becomes a primary focus of healthy living. Physicians cannot teach patients to lead healthy lives (the essence of prevention known to Hippocratic physicians 2,500 years ago) unless they themselves lead healthy lives and are trained in institutions that stress healthy living. It is not a coincidence that an institute for human fitness is an integral part of the first health-oriented medical school in this country, the Texas College of Osteopathic Medicine at Fort Worth.

Finally, the HOPE curriculum would require the

creation of the profession of medical educator. Most medical educators are self-trained, or at best, imitate a favorite teacher from their student days, who probably learned his skills by imitating one of his favorite teachers. Once a consciously determined end product as the outcome of medical education is defined, as it is in HOPE, then consciously trained teachers who can fashion that product must be created as well.

Implementing HOPE

The correct attitude, the appropriate knowledge, and a conducive environment must all be present to accomplish any program. If we were to train all physicians to be health-oriented and continued a reimbursement system which rewards disease orientation and especially rewards procedures that are treatment-interventions, the system would not become health-oriented. If we change the reimbursement system to give physicians the economic incentives to do prevention and health promotion, but they do not know what to do or how to do it, we would probably be even worse off. Thus health-oriented physician education, at the graduate and continuing education levels as well as at the undergraduate level, is absolutely necessary. To develop such a program is a complex process.

Rather than determining content by having the faculty teach what they know, the usual approach, it will be necessary to determine what the students need to know and be able to do to be a health-oriented physician. Knowledge in medicine, at least in relation to the human mind's ability to assimilate and use it, is infinite. Only a limited amount of knowledge and a limited number of competencies can be taught in medical schools, and the faculty of every medical school is already making choices of the possible knowledge and competencies. The HOPE philosophy is that the present choices that are being made are, in part, incorrect. There is a body of knowledge that concerns health promotion and disease prevention and specific skills and behaviors that physicians can learn and use for the benefit of their patients; these are being taught in few medical schools. If physicians who can care properly for people as described in "Healthy People" and "Objectives for the Nation" are to be created, this body of knowledge and these skills and behaviors must be covered by the curriculum in all medical schools.

Obviously, aspects other than curriculum development will also require rethinking—admission policies and procedures; evaluation of student performance; developing a personal health promotion program for each student; research policies; faculty recruitment, retention, evaluation, and rewards; and the administrative structure. In my view, however, curriculum

Curriculum for Health-Oriented Physician Education

	<i>Basic science track</i>	<i>Individual medicine track</i>	<i>Group medicine track</i>
What is...	Health		
	Organ systems in health: <ul style="list-style-type: none"> • Physiology • Anatomy • Psychology Tissues, cells, and subcellular structures: <ul style="list-style-type: none"> • Histology • Cell physiology • Biochemistry 	Gathering the data base: <ul style="list-style-type: none"> • Interviewing • Family dynamics • Patient teaching • Group process Personal health promotion program (PHPP)	Describing the population <ul style="list-style-type: none"> • Use of epidemiology and biostatistics • History, philosophy, and principles of medicine • Natural history of health and disease • Health status indicators • Medical anthropology and sociology
	Disease		
	Pathophysiology either by: <ul style="list-style-type: none"> • Inflammation • Immune response • Neoplasm • Ischemia • Pain • Depression • Anxiety • Happiness • Well-being • Homeostasis Or by organ systems	History-taking and physical examination Mini-clerkships PHPP	Epidemiology of disease Risk factors Health maintenance
What to do for...	Individuals and families		
	Clinical pharmacology Infectious diseases Immunology Microbiology Critical appraisal of data	Diagnosis Therapy Clinical preventive medicine Rehabilitation medicine PHPP	Use of community resources Clinical epidemiology Health promotion Patient education Team practice
	Communities and populations		
	Health care delivery systems analysis Health politics Policy analysis Program planning	Epidemiology of the practice Practice management Occupational medicine PHPP	Environmental health Industrial hygiene Health education Health services administration Community diagnosis

design is central. It will strongly influence the other aspects of the school.

Curriculum to Implement HOPE

I have developed a proposal for an overall curriculum to implement HOPE (see chart). There are a variety of potentially successful approaches which could be undertaken to establish such a curriculum. My proposal is designed to meet the stated objectives and to be flexible in the use of teaching and learning modalities. It does not *require* new teaching methods. However, problem-based learning can be incorporated into the curriculum from the beginning, or it can be phased in gradually. The curriculum is designed to integrate knowledge of the population's health and knowledge of disease as well as material on the health and disease conditions of the individual at all stages of the professional training. In my proposal, it is assumed that all the material presented to students will have a clinical focus, relating to the role of the practicing physician. Therefore the reference points for all learning in such a curriculum are the individual person and the family, which are the primary responsibility of the practicing physician.

Both macro and micro planning for this curriculum will be done by objective, as recommended by Kane and his colleagues (10), and each course or module will be designed to achieve specified learning objectives. The learning objectives are to be carefully distributed among the various portions of the curriculum. There is elective time in all 4 years of the program.

The curriculum is divided into three tracks, a pattern first developed at the health-oriented medical school at Beersheva, Israel. The track system is also being used in a new medical school at the University of Newcastle, Australia, and it appears in modified form at the Texas College of Osteopathic Medicine.

The three tracks are basic science, individual medicine, and group medicine. This concept ends the artificial and counter-productive distinction between basic science and clinical medicine as before and after areas of study. Furthermore, if problem-based learning is the learning mode, the separations between basic science, individual medicine, and group medicine, that exist even in this parallel system, can be ended as well. Graduated, problem-based learning experiences could be devised that integrate appropriate learning objectives from each track as the students progress through the curriculum.

There are two major time segments in this design for medical education, but not in the usual sense that one is devoted to basic science and the other to clinical medicine. In this approach the first segment of medical

education is learning "what is." It is learning how to gather the data base from patients and families and the community if necessary. The two parts or stages of this segment are health and disease. The second segment is "what to do." Its two stages are individuals and families and communities and populations. Again, each stage has elements of each of the three tracks. Although the curriculum is assumed to be 4 years, the time devoted to the four stages would be determined by the goals, objectives, and priorities of the program.

The curriculum is offered to implement "Health Oriented Physician Education" as a means of achieving the goals of "Healthy People" and "Objectives for the Nation." These two documents have presented a major challenge to our country's health professions as well as providing the genesis of this conference.

The knowledge base for prevention in an era of chronic disease has expanded markedly in the last 35 years, an era correctly described by Terris as that of the "second epidemiologic revolution" (11). The health professions have risen to challenges in the past, and I am confident that they can do so again. It is in that spirit that I offer HOPE for the future.

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